

CLAIMS

I claim:

1. An inclination measurement and display device, comprising:
a conductive chamber containing a fluid;
a plurality of electrodes provided in the chamber;
a processing module configured to measure an electrical characteristic between each of the plurality of electrodes and the conductive chamber and to determine an overall angle of inclination and the direction of inclination of the chamber; and
a display for displaying a numerical value corresponding to the overall angle of inclination and an indication of the direction of inclination.
2. The device of claim 1, wherein said indication of the direction of inclination comprises a plurality of indicators positioned radially about said numerical value.
3. The device of claim 1, wherein the electrical characteristic comprises capacitance.
4. The device of claim 1, wherein the fluid comprises a dielectric fluid.
5. The device of claim 1, wherein the conductive chamber comprises an annular chamber having an inner wall and an outer wall.
6. The device of claim 5, wherein said plurality of electrodes comprises three electrodes spaced approximately equidistantly from each other in the annular chamber.
7. The device of claim 5, wherein each of said plurality of electrodes are provided approximately equidistantly from the inner wall and the outer wall of the annular chamber.

8. The device of claim 7, wherein said plurality of electrodes comprise conductive plates provided in the annular chamber.

9. The device of claim 1, wherein said processing module comprises:
an oscillator; and
a microcontroller configured to count the oscillator's output cycles.

10. The device of claim 9, wherein said processing module further comprises:
a controllable switch for selectively coupling the oscillator with each of the plurality of electrodes.

11. An inclination measurement and display device, comprising:
an enclosure having a reference surface;
an inclination sensor provided in the enclosure and being configured to measure a first electrical characteristic indicative of an inclination of the reference surface along a first axis and a second electrical characteristic indicative of an inclination of the reference surface along a second axis, wherein said inclination sensor outputs a first signal corresponding to the first measured electrical characteristic and a second signal corresponding to the second measured electrical characteristic;
a processing module for receiving the first and second signals from the inclination sensor and processing the first and second signals to determine the overall angle of inclination and the direction of inclination of the reference surface; and
a display for displaying a numerical value corresponding to the overall angle of inclination and a directional indication corresponding to the two-dimensional direction of inclination.

12. The device of claim 11, wherein said directional indication comprises a plurality of indicators positioned radially about said numerical value.

13. The device of claim 11, wherein the first electrical characteristic comprises capacitance.

14. The device of claim 13, wherein said inclination sensor comprises:
a conductive housing defining a chamber;
a plurality of electrodes provided in the chamber; and
a dielectric fluid provided the chamber.

15. The device of claim 14, wherein said conductive housing defines an annular chamber having an inner wall and an outer wall.

16. The device of claim 15, wherein each of said plurality of electrodes are provided approximately equidistantly from the inner wall and the outer wall of the annular chamber.

17. The device of claim 15, wherein said plurality of electrodes comprise conductive plates provided in the annular chamber.

18. The device of claim 11, wherein:
said inclination sensor comprises a plurality of electrodes.

19. The device of claim 18, wherein said processing module comprises:
an oscillator; and
a microcontroller configured to count the oscillator's output cycles.

20. The device of claim 19, wherein said processing module further comprises:

a controllable switch for selectively coupling the oscillator with each of the plurality of electrodes.

21. A method of measuring inclination, comprising:

measuring a first electrical characteristic indicative of an inclination of a reference surface of an enclosure along a first axis and a second electrical characteristic indicative of an inclination of the reference surface along a second axis;

outputting a first signal corresponding to the first measured electrical characteristic and a second signal corresponding to the second measured electrical characteristic;

processing the first and second signals to determine the overall angle of inclination and the direction of inclination of the reference surface;

displaying a numerical value corresponding to the overall angle of inclination; and

displaying an indication of a direction of inclination.

22. The method of claim 21, wherein said measuring the first electrical characteristic and the second electrical characteristic comprises:

measuring an electrical characteristic of a fluid contained in a chamber in a plurality of directions.

23. The method of claim 22, wherein said measuring the first electrical characteristic and the second electrical characteristic comprises:

measuring an electrical characteristic of a fluid contained in a chamber in three non-parallel directions.

24. A method of measuring inclination, comprising:

measuring an electrical characteristic of a fluid contained in a chamber in a plurality of directions;

processing the measured electrical characteristics to determine an overall angle of inclination and the direction of inclination of the chamber;
displaying a numerical value corresponding to the overall angle of inclination; and
displaying an indication of a direction of inclination.

25. The method of claim 24, wherein said measuring the electrical characteristic comprises:

in each of the plurality of directions, measuring a capacitance value between a pair of electrodes immersed in the fluid contained in the chamber, wherein the fluid is a dielectric fluid.

26. The method of claim 24, wherein:

said measuring the electrical characteristic comprises measuring a capacitance value between each of at least three electrodes and the chamber to generate three capacitance values; and

said processing the measured electrical signals comprises processing the three capacitance values to determine the overall angle of inclination and the direction of inclination of the chamber.

27. The method of claim 26, wherein:

said processing the measured electrical signals comprises processing the three capacitance values to calculate a capacitance value in two non-parallel directions.